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10TE63

Sixth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Antenna and Propagation

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Explain the following parameters that are related to antennas:
i) Directivity ii) Radiation intensity iii) Beam width. **(09 Marks)**

b. Derive FRII's transmission formula. **(05 Marks)**

c. What is the maximum power radiates at a distance of 0.5km over a free space. The operating frequency is 1000 MHz. The transmitting antenna has a gain of 25dB and the receiving antenna a gain of 20dB. Gains are defined with respect to isotropic source. The transmitting antenna has an input power of 150W. **(06 Marks)**

2 a. Explain the different radiation patterns for an antenna. **(06 Marks)**

b. Obtain the value of electric field intensity in the case of array of 'n' isotropic sources. **(08 Marks)**

c. Calculate the distance between the elements of a broad side array whose beam width between first null's is found to be 45° at a frequency of 10MHz. There are 8 elements in the array. **(06 Marks)**

3 a. Obtain the electric field intensity in the case of a thin linear antenna. **(10 Marks)**

b. Calculate the value of radiation resistance in the case of a short dipole. **(06 Marks)**

c. Obtain the value of directivity when two isotropic sources are oppositely excited. **(04 Marks)**

4 a. Explain with neat diagrams different types of slot antenna and its working concept. **(08 Marks)**

b. Obtain the value of impedance of slot antenna in terms of its complementary dipole antenna impedance Z_d. **(06 Marks)**

c. Explain rectangular and circular Horn Antennas with neat diagrams. **(06 Marks)**

PART – B

5 a. Explain with a neat diagram the working of a front feed and cassegrain feed arrangement for a parabolic dish antenna. **(10 Marks)**

b. Calculate the diameter of a parabolic reflector if the gain is 75dB at 15GHz, area factor is 0.65. **(05 Marks)**

c. Give a explanatory note on corner reflectors. **(05 Marks)**

6 a. Explain with a neat diagram the different modes in helical antenna and give all the empirical parameter values for helical antenna. **(09 Marks)**

b. A helical antenna has 10 turns, 100mm diameter and 70mm turn spacing. The operating frequency is 1GHz. What is the directivity and polarization state? **(06 Marks)**

c. Explain a Yagi-Uda Antenna structure with a neat diagram. **(05 Marks)**

7 a. Derive an expression for field intensity in the case of a space wave propagation. **(10 Marks)**

b. Explain DUCT propagation. **(05 Marks)**

c. A transmitter radiates 100 watts of power at a frequency of 50 MHz in space-wave propagation. The transmitting antenna has a gain of 5 and a height of 50 mtrs. The receiving antenna height is 2 mtrs. It is estimated that a field strength of 100μr/mt is required to give satisfactory signals at the receiver. Calculate the distance between the transmitting and receiving antennas assuming flat earth. **(05 Marks)**

8 a. Explain the mechanism of ionospheric wave propagation. Also derive an expression for the refractive index of ionosphere. **(10 Marks)**

b. Define the terms: i) Critical frequency and ii) Skip distance for ionosphere. **(05 Marks)**

c. Calculate value of frequency at which the electromagnetic wave should be propagated in the D-region. It is given that refractive index $\mu = 0.5$ and electron density $N = 10^{12}$ electrons/m^3. **(05 Marks)**

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